

## REMARKS

Claims 1-4 are pending. The Examiner has maintained a rejection of Claims 1 - 4 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Dillon et al. (Surface Science 322(1995) 230-242) and Penneck et al. (U.S. Patent No. 4,985,313). As emphasized herein, the cited references fail to teach or suggest deposition of more than one monolayer of  $\text{Al}_2\text{O}_3$  in each deposition cycle as claimed and thus do not render the claims anticipated or obvious.

Applicant agrees with Examiner that Dillon does not expressly teach multilayer deposition. The Examiner has stated, however, that "Dillon et al. discloses that the thickness of an aluminum oxide layer after each cycle depends upon the amount of amorphous aluminum oxide present and the reaction mechanism (see pages 239-241 et seq.) Therefore, the variable of aluminum oxide layer thickness is modified by routine experimentation and is not inventive" (emphasis added). Applicant does not agree.

Dillon is concerned with a self-limiting reaction for depositing  $\text{Al}_2\text{O}_3$ . That is, growth is limited by the adsorption of the aluminum precursor to available binding sites on the substrate surface (see, for example, section 4.2). Because the aluminum precursor binds to the substrate surface only at available binding sites, under saturating conditions no more than a single molecular layer of aluminum can adsorb in each cycle, and excess aluminum precursor does not produce a thicker film. The examiner's attention is drawn to p. 230 ("[T]he adsorption is self-regulating and a full or partial monolayer...is deposited per operational cycle"), where the examiner will note that Dillon mentions only full or partial monolayers, not multiple monolayers. As a result of the self-limiting nature of the reactions, Dillon deposits at most up to one monolayer of  $\text{Al}_2\text{O}_3$  per deposition cycle.

Further, because Dillon is concerned with the controlled, self-limiting nature of the reactions, routine experimentation would not lead to deposition rates above one monolayer per cycle; there is no reason for Dillon to change the reaction conditions to be outside of the self-limiting regime. Indeed, because it is the goal of Dillon to achieve controlled, self-limiting deposition there is no suggestion in Dillon of anything other than atomic layer controlled growth and changing the reaction conditions to deposit more than one monolayer would frustrate this purpose. Moreover, if attaining higher deposition rates were a matter of routine experimentation, Dillon would have done so rather than report a lower deposition rate, especially given the temperature experimentation Dillon *did* do. (See page 238.)

Again, Dillon is concerned with a precise, controlled deposition process that is self-limited by the available binding sites on the substrate surface and thus will not go above one monolayer per cycle. Adjusting the deposition rate to greater than one monolayer per cycle would frustrate Dillon's purpose. Thus, one of reasonable skill in the art would not have a reason to vary the process of Dillon above one monolayer cycle. Moreover, there is no teaching or suggestion in the cited references of how a deposition rate of greater than one monolayer per cycle could even be achieved. Without a reason to modify Dillon as suggested by the Examiner and an expectation of success in the modification, the claims cannot be found to be obvious. "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness"). *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1740-1741 (2007). See also MPEP § 2143.02.

Finally, Applicant notes that the Advisory Action states that "though the applicant argues that the process of Dillon is self-limiting, Dillon discloses the same procedure as the applicant, so if it was truly self-limiting, the 'more than one monolayer' limitation in claim 1 would be improper." Again, Applicant disagrees. If Dillon disclosed the same procedure as the claimed process, it would anticipate, which the Examiner has recognized it does not.<sup>1</sup> Claim 1 is directed to a process of growing a thin film of aluminum oxide by a sequential vapor deposition process comprising a plurality of cycles, "*wherein in each cycle more than one monolayer of  $Al_2O_3$  is formed.*" This aspect of the claimed deposition process is simply not present in the self-limiting process of Dillon. Applicants are claiming a different process from Dillon. Because they are different processes, the fact that Dillon's process is self-limiting in no way implies that Applicant's claims are improper.

Penneck does not make up for the deficiencies of Dillon. As a result, Applicants submit that a prima facie case of obviousness has not been established and request withdrawal of the rejection of Claim 1. Dependent Claims 2-4 teach further distinguishing features of particular

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<sup>1</sup> Applicant notes that Dillon does not inherently teach the claimed process because inherency requires that the prior art *necessarily* achieves the claimed result and Dillon clearly teaches deposition of less than a monolayer of  $Al_2O_3$  per cycle. "Inherency, however, may not be established by probabilities or possibilities. The fact that a given thing *may* result from a given set of circumstances is not sufficient." *In re Oelrich*, 666 F.2d 578, 581, 212 U.S.P.Q. 323, 326 (CCPA 1981).

utility, but are not separately addressed in view of the patentability of Claim 1, as discussed above.

**Conclusion**

In view of the remarks presented herein, Applicant respectfully submits that the pending claims are not obvious in view of the combination of Dillon and Penneck and request withdrawal of the rejections under 35 U.S.C. § 103(a) and allowance of the pending claims.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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